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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Geotechnical stability analysis, fragility of structures and velocity of movement to assess landslides vulnerability" *by* O. Cuanalo et al.

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We wanted to mention that, the purpose of this article is to assess the vulnerability of places of the Puebla's mountainous region, where disasters have occurred by this phenomenon, but there is not enough information available for a probabilistic analysis (statistical data).

The authors believe that is very important to take specific actions to assess vulnerability to reduce landslide disasters at the mountainous regions of Puebla. This article, which aims to incorporate engineering concepts and formal analysis of geotechnical stability

and type of construction, whose content may be adopted, if considered appropriate, adapted, edited, and/or modified to any region in general.

Additionally, in the article we start from analysis and geotechnical engineering concepts rather than geo-morphological analysis, although complement each other, the perspective is different in one and another specialty.

Unfortunately in Puebla's mountainous regions, where ethnic groups live, in general the government authorities do not have interest on disaster prevention; they do not invest resources in formal studies and research that help us to develop methodologies that contain a large database for analysis. Research in this field requires significant resources that project financing institutions cannot provide; because of that there is insufficient data available. Furthermore the authorities of Universities are more interesting in politics than in the generation and application of knowledge. We believe that any effort aimed to risk assessment, as presented in this modest but important paper, with all our weaknesses, should be the first step in establishing measures to reduce the risk. If we wait to have a validated methodology with sufficient data, we need to wait many years to do this.

We are going to include more information in Table 2, about geotechnical properties and geometry of the landslides studied at mountainous region of Puebla.

We agree to remove Figures 3 and 4 and adopt the classification of Varnes 1978 to explain the types of phenomena that occurred in our study area.

We agree to use the term "Fall" to talk about fallen rocks and fallen soils.

The term erosion handled in the article refers to large landslides or ground movement of volcanic unconsolidated materials, such as sands and silty sands, which happen during torrential rains and they are removed in large areas with depths of 7-8 m, could be understood as shallow landslides that could be used instead of erosion.

Graphs of rainfall presented in this article as a meteorological phenomena, has the

purpose to sensitize the reader, that water is one of the main factors that triggers landslides. Because of that we do not agree to withdraw graphics of rain because they are very important.

Table 3 explains the damage assessment by the federal government (Morales 2001) and researchers (Bitran and Reyes 2000). We will do a better explanation of it. The cost of damage is only landslide.

In the text that will adapt to climate change refers on page 5694, we do not have enough technical support to sustain it, therefore we are going to change the paragraph.

In Figure 6 the rainfall are highest monthly values.

Figure 1 presents sequentially step by step the manner in which we have to study and investigate the risk of landslides, including the concepts of hazard, vulnerability and cost of exposed and vulnerable elements. This sequential chart was made by the authors of this article.

Validation of Figures 9 and 11 can be made once apply systematically the methodology to landslides occurring in a specific region, and it will be reported in another paper.

Currently we are correcting the paper to meet the referee's comment.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 5689, 2014.